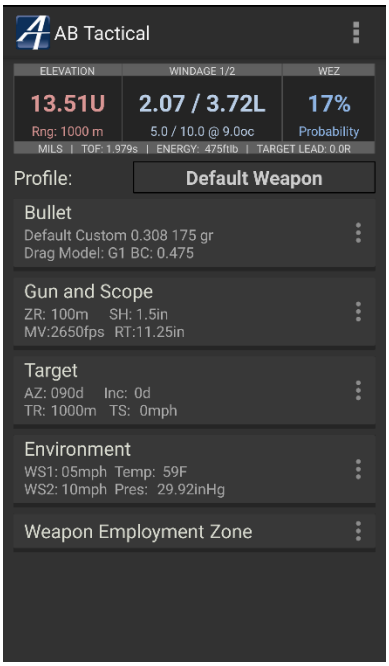
Applied Ballistics Tactical (AB Tactical) User Manual



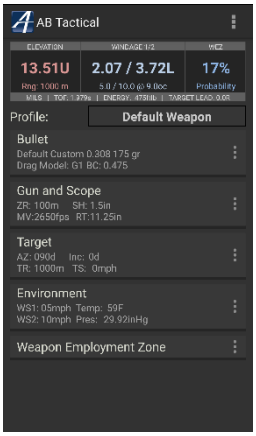
1.0 Introduction

The Applied Ballistics Tactical (AB Tactical) software is a full-featured ballistics solver made to run on Android devices. It has been specifically optimized for both speed and accuracy. Nearly every function and parameter is available within 1-2 clicks and all parameters are immediately visible from the main viewing screen. The application continually shows the most recent windage and elevation holds from all user screens and the solution updates instantly as parameters are changed. In addition, from the main screen there is simple and fast access to modification of the wind speed and 1-click access to a full range card. This App is also the only mobile application that can upload a user profile to a compatible Applied Ballistics device. (Kestrel 4500 Applied Ballistics, Kestrel Sportsman, RAPTAR-S, REM 200).

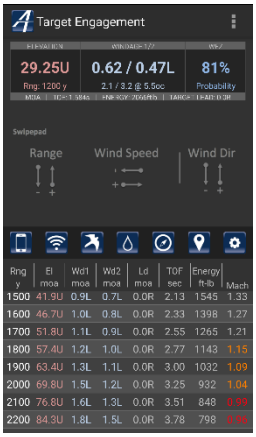
The AB Tactical software supports not only the G1 and G7 drag curves but also has the full Applied Ballistics Custom Drag Curve Library (Over 425 Bullets). For extreme long range target engagements, using these curves enable higher accuracy without drag curve calibration. For user custom bullets, two automated calibration tools are included that dramatically increase accuracy at long range. First, muzzle velocity is calibrated by firing at a range where the round is supersonic. The user enters the actual drop at that range, and the application computes the calibrated muzzle velocity automatically. Second, for long range shooting - where the round is subsonic – Applied Ballistics uses the observed drop at another range to automatically compute the drop scale factor (DSF).

This DSF provides a finer level of control in the subsonic flight than BC-Mach/Range tables, especially when used with the custom drag curves that Applied Ballistics has computed for many common bullets. These highly accurate solutions are displayed in easy-to-read range cards.

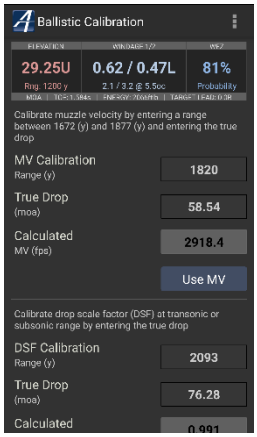
A number of the application screens are shown below.



Main Application Screen - All parameters immediately visible



Target Engagement Screen (Range Card) – Elevation, Windage, Target Lead and Velocity showing transonic and subsonic bullet flight



Ballistic Calibration Screen – Simple to use calibration screen allows for quick setting of the Muzzle Velocity and DSF

Fire Solution Control or HUD has information that is updated in real time including Elevation, Wind 1&2, WEZ Probability, TOF (Time of Flight), Remaining Energy, Target Lead, and current output units. (Wind 2 is a real time feed of the wind speed on the Kestrel when Bluetooth connected to a Kestrel 4000 series device.

2.0 General Application Controls

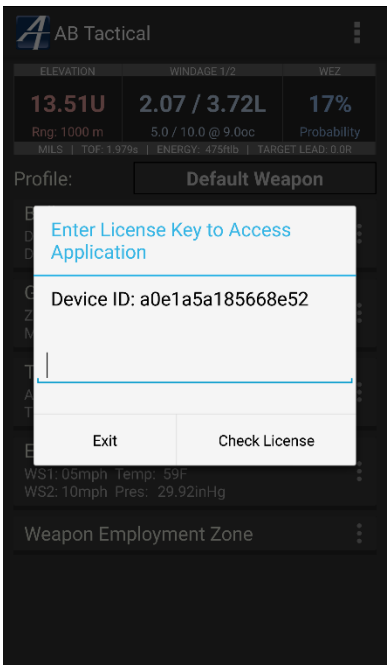
Many functions and controls are universal in the application. These help you to navigate, change units, and edit values inside the application.

Getting back to the Main Screen To access the Main Screen, hit the Android back button from any of the sub menus. This will return you to the main screen.

Editing a Value To edit a value, click on the appropriate text entry box on the right hand side. By pressing a single time, all of the number is highlighted and you may begin immediately typing the correct number. If the value does not highlight, or if the value is greyed out, then you will not be able to edit that value.

Changing Input Units For each of the input units that have a blue button, the input units are adjusted by clicking on the button. The units displayed below the button are changed and the value in the corresponding edit box is automatically converted.

3.0 Application Installation

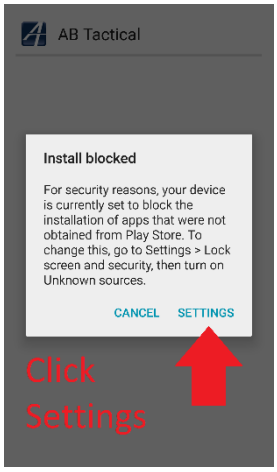


To install the application, installation of third party applications must be enabled on your Android device. To enable this feature, choose the Settings menu from your Android device. Access to the settings will vary from device to device though and check with your specific manufacturer for direct access to the settings.

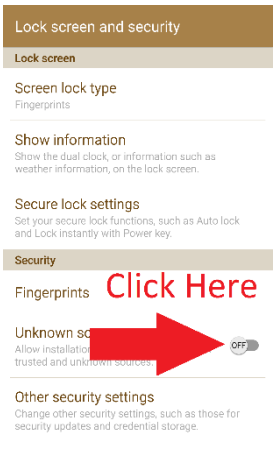
Once in the settings menu, select Applications → Enable Unknown Sources. A pop up window will ask you to confirm that you wish to enable the settings. Select OK and continue. After third party sources have been enabled, you may now download the AB Tactical application directly from the link supplied by Applied Ballistics Inc. An example of how this is performed is shown below.

Immediately upon launching the application, you will be required to enter the license key. This must be requested directly from Applied Ballistics for each device that the application is installed on. The license key will be a combination of characters, numbers, and letters which may be copied and pasted directly into the text entry.

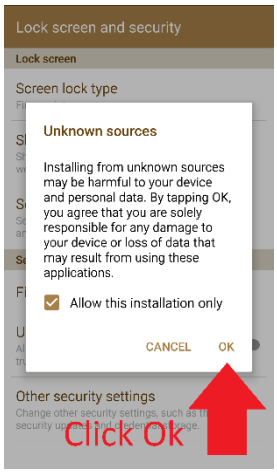
Upon entering the key, press Check License and if the license key is accepted, the application is unlocked permanently for the device. If the key is not entered correctly, the application exits automatically. The application will also exit if any area outside of the dialog is pressed.


AB Tactical
Install blocked
For security reasons, your device is currently set to block the installation of apps that were not obtained from Play Store. To change this, go to Settings > Lock screen and security, then turn on Unknown sources.
CANCEL
SETTINGS
Click Settings

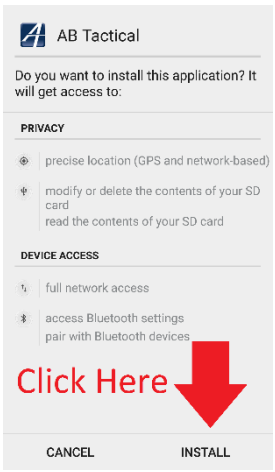
Many android devices are not set up to install unknown software. When prompted you will need to go to settings.



You need to allow installation from unknown sources.

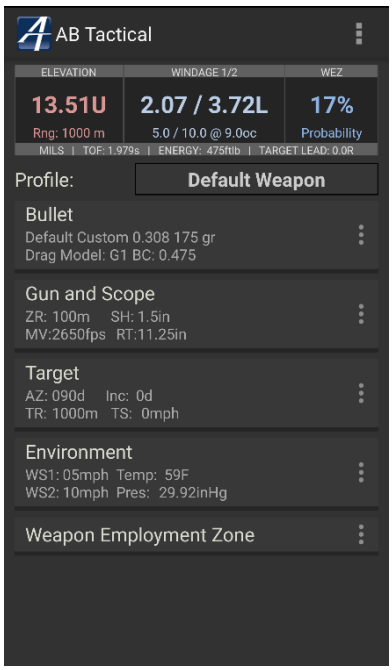

Lock screen and security
Lock screen
Screen lock type
Unknown sources
Installing from unknown sources may be harmful to your device and personal data. By tapping OK, you agree that you are solely responsible for any damage to your device or loss of data that may result from using these applications.
Allow this installation only
CANCEL
OK
Other security settings
Click Ok

Read the warning, and accept to install.

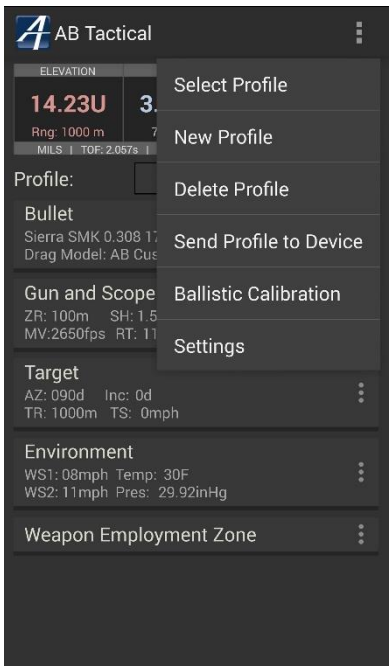

AB Tactical
Do you want to install this application? It will get access to:
PRIVACY
precise location (GPS and network-based)
modify or delete the contents of your SD card
read the contents of your SD card
DEVICE ACCESS
full network access
access Bluetooth settings
pair with Bluetooth devices
Click Here
CANCEL
INSTALL

It will then allow you to install.

4.0 Main Screen



Main Menu



Profile management options are available via the Android Action Bar

Multiple weapons can be saved on a single device, selected by pressing the ⊕ symbol

The main screen of the application provides a quick view of all of the current bullet, gun, target, and environmental conditions. At the top of the main screen and all edit screens is a view of the elevation and windage holds for the current settings.

Navigation To move into any of the edit screens for the Bullet, Gun and Scope, Target, or Environment, press the ⋮ button located on the right of each of the sections.

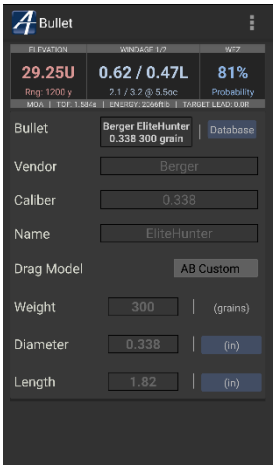
Editing a Profile AB Tactical application uses the concept of profiles to manage a bullet and gun combination. The currently selected profile is displayed on the main screen. When the application is launched for the first time, the name **Default Weapon** will appear in the profile section. It is recommended that you immediately rename this profile to your gun name. It is important to know that any parameters that are edited for the bullet and the gun/scope will be directly modified for the currently selected profile. Parameters of other profiles will not be modified. All changes made to the bullet and gun settings are immediately saved to the profile database. There is no need to additionally save the profile.

Creating a New Profile To create a new profile, use the Android Action bar and select **New Profile** from the menu. The current active profile will be saved to the database and a new profile will be created with the default bullet and default gun settings. The name on the main screen will be reset to **New Profile**. Any modifications that are made to the new profile will be saved. It is required that you edit the name from **Default Weapon** to your new profile name in order to be saved to the database.

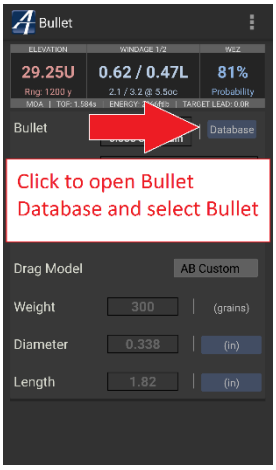
Deleting a Profile To delete the active profile, select the **Delete Profile** option from the Action Bar. The currently selected profile will be deleted and the next profile in the database will become active. If no other profiles exist, a new profile will be created with the default settings.

Selecting a Profile To switch the active profile, **Select Profile** from the Action Bar. A list of your previously saved profiles will be shown. To select the desired profile, click on the ⋮ next to the name of the desired profile. The profile will be loaded from the database and the active bullet and gun settings will be updated to match the selected profile settings.

5.0 Bullet Screen



Clicking Bullet Selection shows the list of available bullets in the database.



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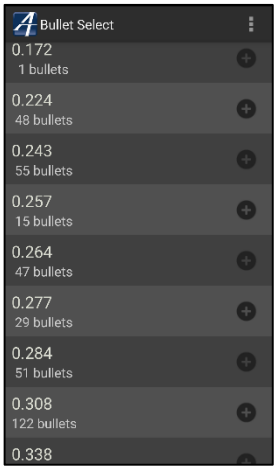


A list of calibers is then presented. Once the caliber is selected, a list of manufactures is shown

To select a specific bullet, click the ⊕ icon on the desired bullet.

The bullet properties edit screen is accessible from the main screen by clicking on the ⋮ icon on the right of the bullet section. This edit screen allows the user to edit parameters about the bullet itself, including ballistic coefficient, drag curve, bullet weight, bullet diameter, and bullet length. In addition, AB's extensive bullet library can be accessed from here by clicking on the **Bullet Selection** button.

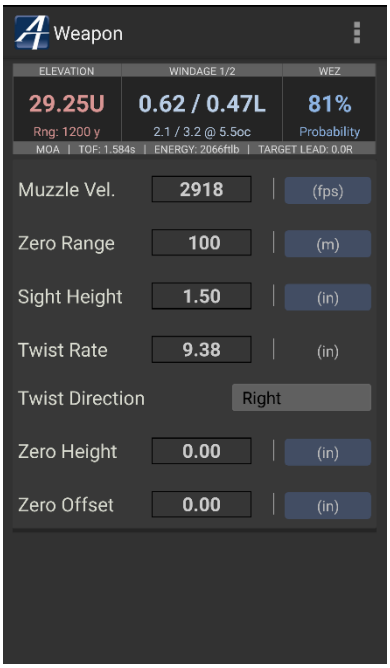
Using the Bullet Database The bullet database includes parameters for over 425 bullets, including bullet weights, diameters, lengths, G1 & G7 ballistic coefficients, as well as AB-measured custom drag curves. These custom drag curves provide a highly accurate drag model through transonic flight, and are recommended for use instead of G1 & G7 to maximize accuracy.

Selecting a Bullet To select a bullet, click on the Database button from Bullet Screen. First, a list of calibers will be presented, then a list of manufacturers, and finally the list of bullets. This is shown below. Selecting a bullet will overwrite the current settings in the Bullet Screen. For bullets selected from the database, they will be accessed in a read-only mode and the parameters will not be able to be modified by the user. For user created bullets, all options will be available for modification and any modifications that are made to the currently selected bullet will be immediately saved into the database as the parameters are modified.

Selecting the Drag Model of a Bullet Most long range bullets are better matches to the G7 standard, and using G7 BC's (Ballistic Coefficient) will provide sufficiently accurate trajectory predictions out to a range where the bullet slows to transonic speeds (~1340 fps). Be sure that if you select the G7 drag model that you enter a G7 BC (not a G1 BC).

When using custom drag curves, the ballistics engine is solving the equations of motion using the exact drag curve for a specific bullet, not referencing a standard (G1 or G7) curve. The added accuracy in trajectory predictions that is possible with custom drag curves is especially valuable when shooting at targets at or beyond transonic range, because that's the speed region where drag curves tend to diverge most. Once a bullet has been selected from the database, selection of the drag model is performed by clicking on the pull down menu. For bullets that Applied Ballistics has measured, the G1, G7, and Custom curve is available. For user created bullets, only the G1 and G7 will be able to be selected.

6.0 Gun and Scope Screen



The **Gun and Scope** properties edit screen is accessible from the main screen by clicking on the ⋮ icon on the right of the appropriate section. This edit screen allows the user to edit parameters about the gun and scope, including the muzzle velocity, the zero range, the sight height and the twist of the barrel.

When any of the settings are modified on this screen, the **Fire Control Solution Panel** at the top of the screen is immediately recalculated and displayed. These modifications are performed on the currently selected profile only.

When using a suppressed weapon, you can adjust for the shift in zero that occurs when removing or adding a suppressor by using the Zero Height/Offset feature. Create two profiles, one for suppressed and one for not. Then input the shift in zero when the suppressor is removed in to the Zero Height/Offset variables.

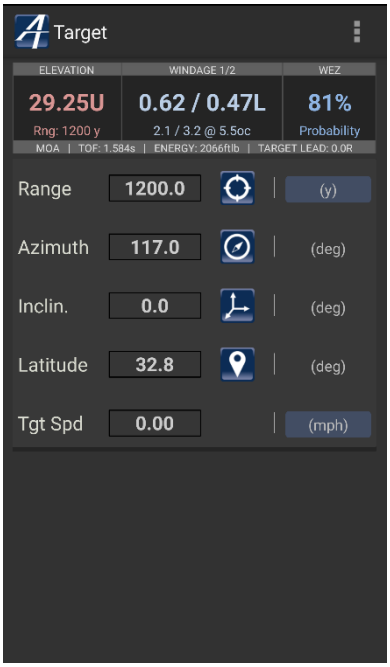
Sight Height is from the Center of the Bore to the Center of the Scope, best measured if possible at the turrets. An easy way to do this is with this formula. (Barrel width ÷ 2) + (Scope Width at Turrets ÷ 2) + distance between scope and barrel = Sight Height. Note, do not measure the turret itself, only the scope tube.

Tapered Scope Mounts If you have a tapered scope mount (example 20 or 30 moa scope base), you do not need to worry about inputting this. Measuring the scope from the center of the turret location eliminates any error this may cause. If you choose to measure the scope at the bell the error will be around 1 click at 1000 yards when using a tapered mount, no error will exist when using a standard scope mount. For all practical purposes even with a tapered scope base you can measure from the bell of the scope and still be on target.

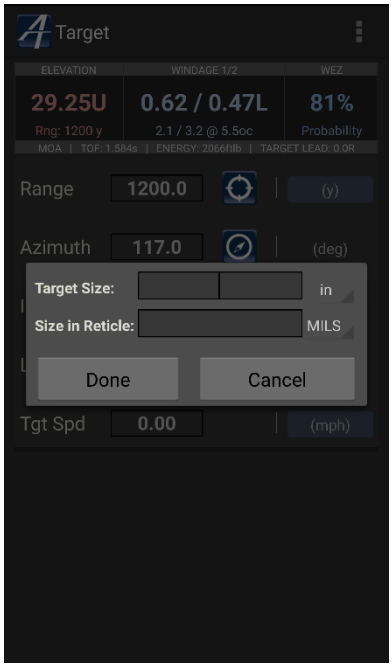
Muzzle Velocity can be either measured from a chronograph or you can use the ballistic calibration system to use live fire data to update the muzzle velocity at any time. See Ballistic Calibration (section 9) for more details.

Zero Height/Offset Many times when you zero your rounds will fall slightly off center, but adjusting the turret will only offset them the other direction. When your zero falls slightly off the dead center of the target you can measure this and input it here, helping to eliminate any long range errors that can occur from this.

7.0 Target Screen



Target Screen



Target Range Estimation

The **Target Screen** properties edit screen is accessible from the main screen by clicking on the ⋮ icon on the right of the appropriate section. This edit screen allows the target including information such as the range, heading to target (0 degrees is North, 90 degrees is East), inclination angle to target, latitude, and target speed. A positive target speed indicates left to right and a negative target speed indicates a right to left target movement.

Target Range Estimation You can estimate the range to the target using the scopes reticle by clicking on the Icon and it will bring up a dialog box. You can change the units via drop down menu by clicking on the units you wish to change.

Acquiring Data from Sensors Most phones are equipped with a number of sensors for orientation and position. To obtain sensor readings directly from the phone for heading, inclination, and latitude, click on the associated icons ( ).

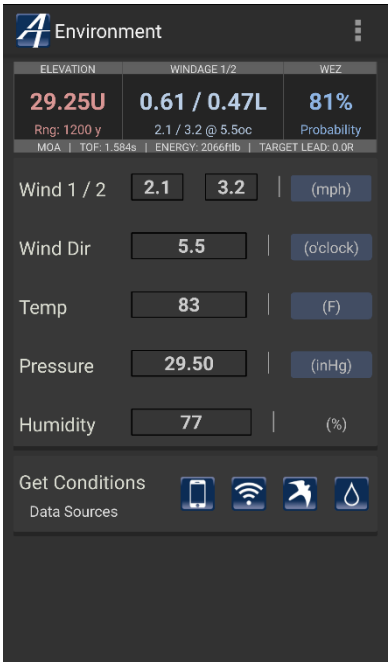
Azimuth In order to accurately measure azimuth using the phones sensors its bets to place the phone on a cold barrel (Cold barrels only or you will damage your device) then acquire while aiming at the target with the weapon. **Note: Placing your device on a hot weapon will damage it.**

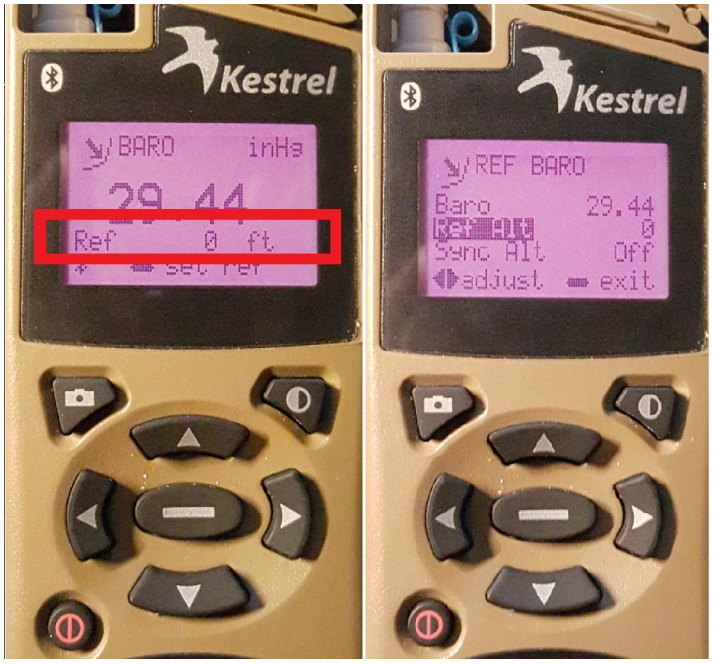
Inclination In order to accurately measure inclination using the phones sensors its bets to place the phone on a cold barrel (Cold barrels only or you will damage your device) then acquire while aiming at the target with the weapon. N**ote: Placing your device on a hot weapon will damage it.**

Latitude Devices with built in GPS can automatically acquire your location allowing for the firing solution to calculate the proper spin drift and Coriolis Effect.

Target Speed You can enter a speed for a moving target and the Range Card or HUD will populate a moving target hold over.

8.0 Environment Screen





Environment Screen **Proper Kestrel Setup**

The **Environment Screen** properties edit screen is accessible from the main screen by clicking on the ⋮ icon on the right of the appropriate section. This section allows the user to enter values for the wind speed, the direction it is coming from, temperature, pressure and humidity. In the case of wind direction, the number represents the direction **from which** the wind is coming; so a 12 o clock wind is coming directly at the shooter from the target direction, a 9 o clock wind is blowing from left to right across the range.

Atmospheric inputs have historically been the least understood and causes the most trouble for shooters running ballistics programs, in particular the pressure inputs. The following discussion elaborates on the correct way to manage these variables. There are two options for describing pressure to a ballistics program; 1) Enter the barometric (aka *corrected*) pressure and altitude, or 2) Enter the Station pressure where you are. Some definitions are in order regarding barometric and station pressure.

Barometric pressure is also known as sea level corrected pressure, and is what the weather station and airports report because it's useful for pilots and making weather assessments. Barometric pressure is not the actual air pressure where you are, rather it's a number that's corrected to sea level. In order to determine the actual air pressure where you are (which is what the ballistics program cares about), you have to account for the effects of altitude. However if you have a handheld weather meter like a Kestrel, you can measure *Station Pressure* directly which is the actual air pressure where you are. This is the preferred method of inputting pressure data because it's one less input and relies on only one measurement instead of two.

A common error is to mistake station pressure for barometric or vice versa. The consequence of this error is that the wrong air density gets applied which degrades the accuracy of trajectory predictions. This error is increasingly more severe the higher up you are above sea level.

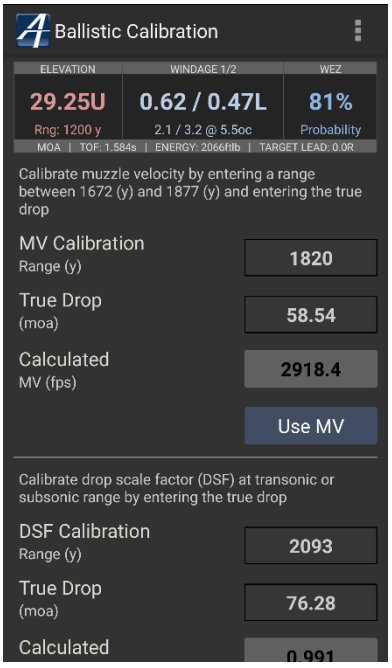
The proper setup for the Kestrel is shown above. Ref Alt at 0, Sync Alt Off.

Wind 2 can be used in two different ways. It can be used to bracket your wind call, or as a live feed from your Kestrel Device. As an example, if the wind is between 5 and 10 mph, you would set **Wind 1** to 5 mph and **Wind 2** to 10 mph. If the wind is currently 7-8 mph, the user can then mentally interpolate the correct value for the wind hold. Note that the aerodynamic jump value for elevation is computed off of Wind 1 and when a Kestrel device is connected it only modifies Wind 2. Wind 2 is the Live Feed from your Kestrel Device. If you have a Kestrel Wind Meter connected this will update in real time, until that connection is disabled.

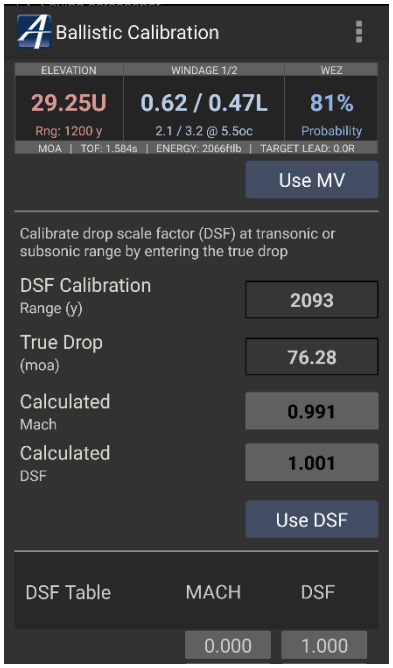
NOTE: In the AB Tactical software, station pressure must be used – this is what is reported by the Kestrel device and most handheld weather meters or watches.

Acquiring Data from Sensors Most new phones are equipped with a pressure sensor and are capable of an internet connection. To obtain the station pressure directly from the phone, click the icon. To obtain the local temperature and humidity via the closest weather station, click the icon.

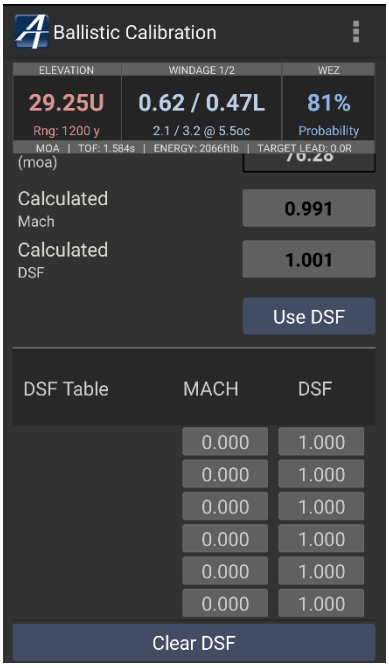
9.0 Ballistic Calibration Screen



MV Calibration



DSF Calibration



DSF Table

The ballistic calibration feature allows a user to calibrate the ballistic solution based on observed bullet drop at range. There are two parameters that can be calibrated: muzzle velocity (MV), and drop scale factor (DSF). The **Ballistic Calibration Screen** is available from any screen via the Android Action Bar.

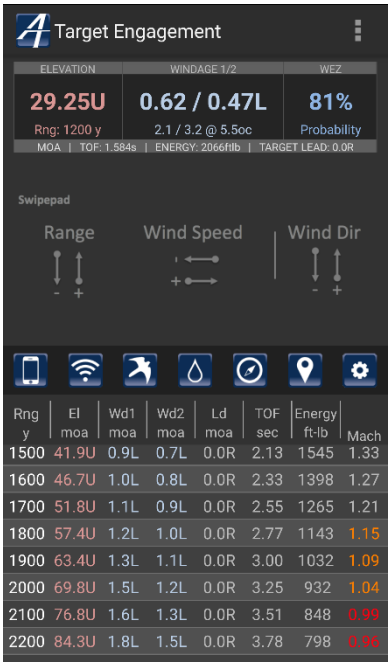
Due to uncertainties involved with modern chronographs, velocity measurements are not always as accurate as we would hope. Therefore the first variable a shooter should attempt to calibrate is muzzle velocity. The recommended range for muzzle velocity calibration is where the bullet is at Mach 1.2 in its

flight. If you have multiple 'observed' data points, use the farthest high confidence data point available for muzzle velocity calibration. The interface will provide recommended ranges range in which to calibrate muzzle velocity based on the bullets remaining velocity. After you've entered the observed range/drop pair, the application will automatically calculate the adjusted muzzle velocity and the application will display the actual MV that results in your observed drop. Click **Use MV** and the calculated MV will be applied and the elevation and windage shown at the top of the screen will be automatically updated.

For long-range shooting, the drop scale factor (DSF) is used to refine the ballistic solution in subsonic flight using a similar process. By firing rounds at long range, and noting the true drop, a drop scale factor is computed. Clicking **Use DSF** populates the DSF value and Mach number into the View DSF Table

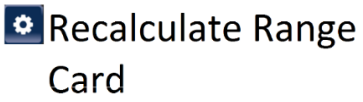
Viewing the DSF Table By scrolling down, the full DSF table is presented based upon all DSF values that have been calculated and saved. The table can be cleared by clicking on the **Clear DSF** button.

10.0 Target Engagement (Range Card)



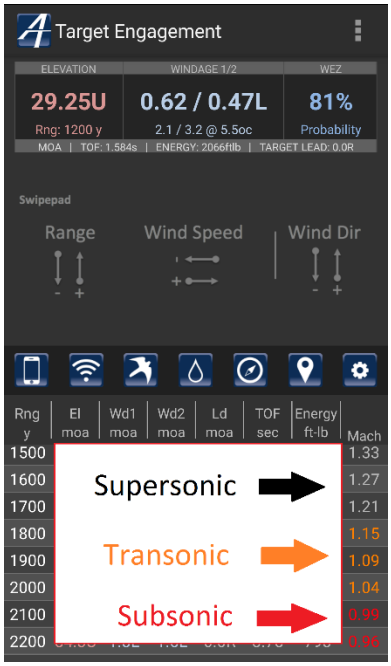
Range Card

Access the Range Card by clicking on the Fire Control Solution Panel at any time.



If you need to update or refresh the range card, simply click the Icon indicated above. This is important to do after updating atmospheric information, muzzle velocity, DSF factors, wind speed, or moving target speed.

HUD



Mach Speed Indicators

The range card is accessible by clicking anywhere on the **Fire Control Solution Panel** from any screen. By clicking on the solution, a range card is displayed that shows the ballistic computation at user-set increments, accessed by clicking the *Settings* button from the Action Bar. The range card shows the range to target, elevation, windage, the target lead, time of flight, and the velocity of the bullet in Mach. The range card shows MACH in orange where the bullet is in the transonic region and then in red where the bullet is subsonic.

Range Card Characteristics From the settings menu, you can access and adjust the range cards maximum range out to 3500, or the Step Size of each range (5, 10, 25, 50, 100 increments). To access the settings simply press the ⋮ icon in the upper right corner and select settings.

Updating Environmental Information You may update the environmental information from the range card at any time by selecting the appropriate method from the buttons located on the range card. If you need to make quick wind adjustments you may do so by using the Swipepad then selecting the recalculate range card button. The Fire Control Solution is updated in real time when using the Swipepad but the Range Card is not.

Updating Target Information You can update your Latitude and targets Azimuth by selecting the appropriate buttons from the range card. This can allow for rapid on the fly adjustments to the direction of fire to the target.

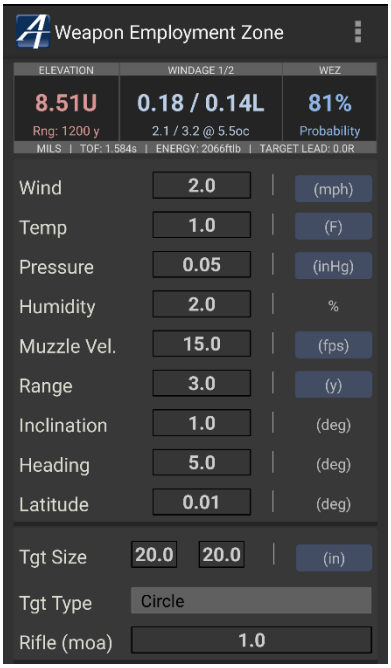
Updating Range Card If you have made any changes involving either the targets direction, your location, or the environment and need the range card to reflect those changes, simply click on the recalculate range card button. If you have made any changes it is always advisable to update the range card after words.

Note: The Range Card has a couple features that allow for quick adjustments on both the Fire Control Solution (HUD) and on the Range Card.

Clicking a Range Value Clicking on a range value in the table will automatically insert that range value in to the HUD. Example, if you click 1200 on the table, 1200 will then be inserted in to the Elevation portion of HUD. If you click 500 on the table then 500 will be inserted in to the HUD. **Note: This is the best method for rapid range adjustments to the HUD.**

Using the Swipepad If you need to make quick wind or range adjustments you may do so by using the Swipepad, then selecting the recalculate range card button. The Swipepad has indicator arrows and a vertical bar designating which side of the table adjusts range, and which adjusts wind. The wind speed can be adjusted from either side. The HUD is updated in real time when using the Swipepad but the Range Card is not and therefore you must recalculate the table. When swiping for wind speed, if you increase the wind speed, both wind 1 and wind 2 are updated. **Important Note: If you decrease the wind speed, only wind 1 is decreased. If you need to reduce Wind 2 you must swipe all the way to 0. This will reset the wind speed 2 to 0, then you may increase it to the desired level.**

11.0 Weapon Employment Zone (WEZ)



To enable and utilize the WEZ tool[1], simply click on the Weapon Employment Zone tab to access. This tool allows a user to investigate how the bullet's point of impact is affected by changes or uncertainties in the input parameters, as it can reveal how accurately the parameters need to be measured. The WEZ screen allows the user to enter the precision of various inputs, as well as range to target, the precision of the rifle system used, the shape of the target, and the dimensions of the target. On the top, the results of the computation are displayed when you have the WEZ selected from the Setting menu.

System Variables

The WEZ tool provides the user with the insight to see how each of the variables in the table below affects the accuracy of a ballistic computation and determine probability of hit for every shot. The tool comes prepopulated with some precision values, as described in the table below, mostly based on use of the Kestrel to measure atmospheric conditions. Bryan Litz's *Accuracy and Precision for Long Range Shooting* provides several good estimates for rifle accuracy and muzzle velocity variation. These values can be changed to match the user's experience, such as muzzle velocity variations measured by a chronograph.

The precision numbers are assumed to be one standard deviation values, which is a common measure for the precision of tools making measurements. In this case, 67% of measurements will fall within +/-1 standard deviation of the mean; 95% will fall within +/-2 standard deviations.

Overview of parameters

Parameter	Units for Analysis	Precision (1σ)	Rationale for Precision Value
Temperature	degrees F	1.8	Kestrel Specification
Pressure	inches of mercury	0.05	Kestrel Specification
Relative Humidity	%	3	Kestrel Specification
Wind Speed	MPH	0.5	Kestrel Specification; 3% of measure, say 15MPH
Range	meters	1	COTS LRF accuracy
Azimuth/Heading	degrees	4.0	Honeywell HMR3400, worst case
Latitude	degrees	0.1	Commercial GPS accuracy: <10m
Inclination	degrees	1.0	Honeywell HMR3400, worst case
Muzzle Velocity	FPS	Rifle specific	
Rifle Precision	FPS	Rifle specific	

Once the fields are populated, the probability of hit is computed on the fly, which will compute how each of those error sources influence the bullet's flight, and show the overall probability of hit.

[1] Further discussion on the concept of Weapon Employment Zone and how it can be applied to shooting scenario can be found in Litz's *Accuracy and Precision for Long Range Shooting.*

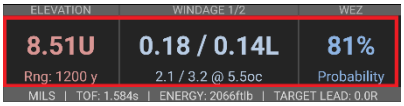
In addition to adjusting the parameters above, the WEZ tool also accepts different target shapes and sizes. The IPSC target is standardized and its dimensions locked, but the rectangle and circle targets can be adjusted to match actual targets in use.

Target parameters

Target Parameter	Description
Target Shape	Three options: Circle, Rectangle, IPSC
Target Width/Radius	Enter the width of the Rectangle target (or the radius if using Circle target)
Target Height	Enter the height of the Rectangle target (not used for Circle)

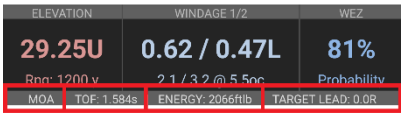
12.0 Fire Solution Control (HUD)

The Fire Solution Control, or HUD is found on most screens. The HUD displays your current Elevation and Windage adjustments along with WEZ, TOF (Time of Flight), Remaining Energy, Target Lead, and current Output Units. The design of the HUD has 2 parts



Output Area 1

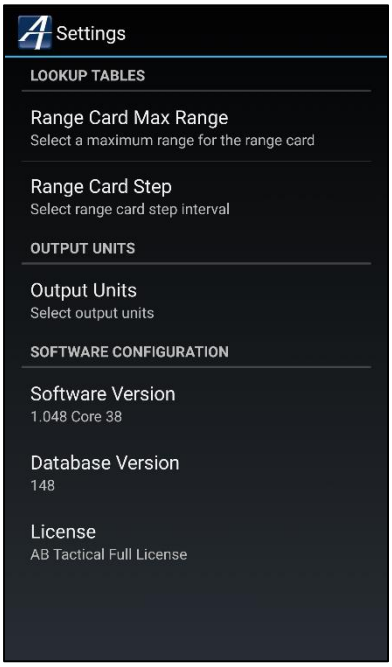
Output Area 1 With 3 main blocks. Section 1 is Elevation with the Range under it. The range will show the output units next to it. To change the output units, you need to change the units used in the Target Screen. Section 2 shows Wind 1 & 2 firing solutions. Under them you will find Wind 1 Speed/ Wind 2 Speed @ Wind Direction. To adjust these units, you do so under Environment Screen. Section 3 is your WEZ Probability. This displays the probability of hitting the target with the first round. See Weapon Employment Zone for more information.



Output Area 2

Output Area 2 There are 4 outputs under the main section. Section 1 is your current output units (MILS, MOA, IPHY), which can be adjusted in the Settings. Section 2 is TOF (Time Of Flight). This tells you how long the bullet will take to reach the current range in the HUD. The third section is remaining Energy. This tells you the amount of energy the bullet will impact with, at the given range in the HUD. The final section is Target Lead. If you input a moving target speed in the Target Screen it will update with the correct hold over to hit a moving target at the given range in the HUD.

13.0 Settings



The application settings are accessible from the Android Action bar. Several items may be adjusted such as the maximum range on the range card, the range card step size, and the output units.

Probability The application has a fully function WEZ program. The header may be used to display the probability of a first time shot at an unknown location.

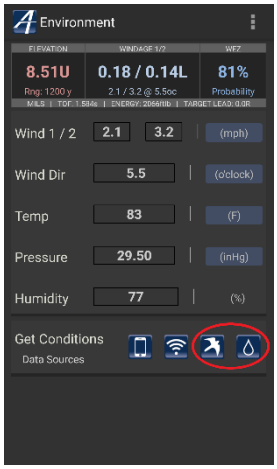
Range Card Max Range Adjusting this will allow you to limit or expand the maximum of the range card up to 3500. This can help improve the time it takes to populate the range card with small step distances by limiting the maximum distance.

Range Card Step This setting adjusts the distance between each range step on the range card. These can be set to (5, 10, 25, 50, and 100).

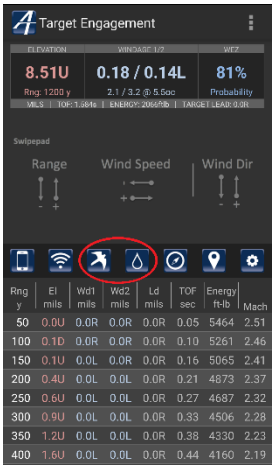
Output Units This setting adjusts the current output units. You have 3 choices. MILS, MOA or Inches (Inches is also known as IPHY or Shooters MOA).

Software Version – Note you will find the software version here as well. 1.048 Core 38. The number 42 in this denotes the build number (48 in this case).

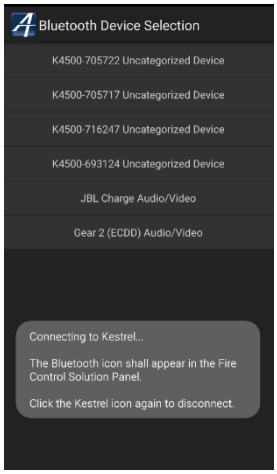
14.0 Connecting to a Kestrel



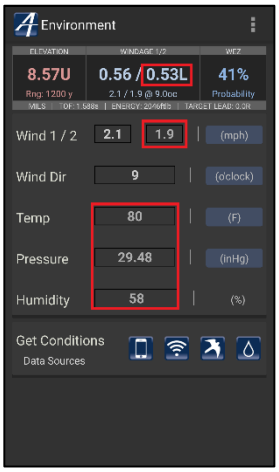
To Start and Stop the Kestrel, select the option from the Action Bar



To Start and Stop the Kestrel, select the option from the Action Bar


Bluetooth Device Selection
K4500-705722 Uncategorized Device
K4500-705717 Uncategorized Device
K4500-716247 Uncategorized Device
K4500-693124 Uncategorized Device
JBL Charge Audio/Video
Gear 2 (ECDD) Audio/Video
Connecting to Kestrel...
The Bluetooth icon shall appear in the Fire Control Solution Panel.
Click the Kestrel icon again to disconnect.

A list of available Bluetooth that have been paired with the device are listed. The Kestrel devices all begin with K####-###### With the last 6 digits being the devices serial number.



Once the Kestrel is connected and data is received, the entries will be grayed out. (Highlighted in red here)

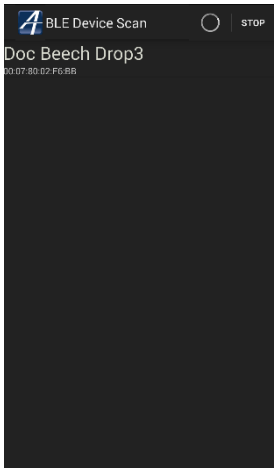
The AB Tactical application has the capability of receiving external sensor input for the environmental conditions from a Kestrel device over a Bluetooth connection. To connect to a Kestrel, the Kestrel must have Bluetooth and it must be enabled. Please review to the Kestrel user manual for how to activate the Bluetooth. Once the Kestrel Bluetooth is active, it must be paired with your device through the Android pairing procedure.

Pairing procedures vary from device to device however; the Bluetooth settings are usually available from the Settings → Bluetooth menu. Most often, there is a button labeled "Search for Devices" that is shown. Click that button and choose to pair with the Kestrel if it is found. A PIN is required to pair with the Kestrel which is available via the **Info** screen located within the Bluetooth menu on the Kestrel. A Kestrel Drop does not require a pin to pair.

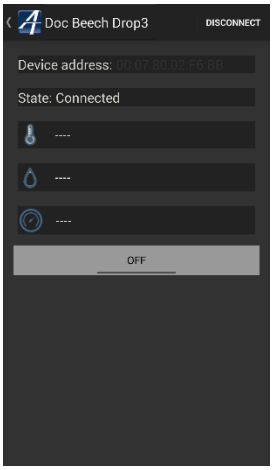
After the pairing procedure is completed, it can be selected from the AB Tactical application by clicking on the Kestrel or Drop Icon from the Environment screen or from the Target Engagement screen. If you are connecting to the Kestrel Device, a list of paired devices will be shown. Click on the device name to use it. Establishing a connection will appear at the bottom of the screen. Once you wish to disconnect from the Kestrel Device, simply click the Kestrel Icon and the connection will be disabled.

Live updates from the Kestrel 4000 series devices will occur at the rate of approximately 1 time per second. The AB Tactical application applies the environmental conditions from the Kestrel directly to the **Main Screen**, **Environment Screen,** and the **Target Engagement Screen**. The wind speed from the Kestrel is populated into the Wind Speed 2 parameter since Wind Speed 1 is editable via the Environment Screen. To see the windage hold for the Kestrel device.

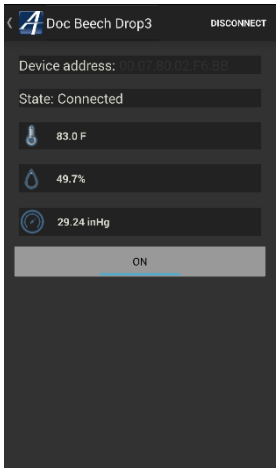
15.0 Connecting to a Kestrel Drop



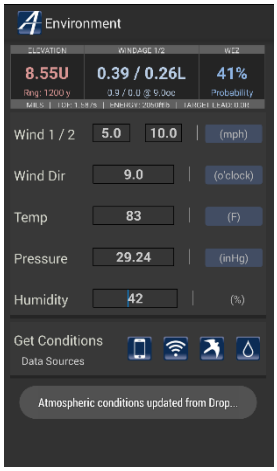
A list of available Kestrel Bluetooth Drop Devices that have been paired with the device are listed.



After the device has been selected, do not switch it to on, until the upper right reads connected. You can see under State is connected.



Once you flip it to on, it then begins transmitting atmospheric data to your mobile device. At this point you press the devices back button until you return to Environment screen.



Notification appears briefly indicating that the information has been populated.

To connect to a Kestrel Drop, select the Drop button from the **Target Engagement** or **Environment Screen**. Upon pressing it, it will immediately scan for Drop devices. When you see your device, click on it to connect directly to it. You will then enter a screen where you have a Disconnect/Connect button in the top right, and an On/Off switch at the bottom. The Drop 3 does not relay data constantly. In order to save battery life it only gathers information on demand when you request it. Also the Drop device you choose will affect the data provided. Only the Drop 3 provides Station Pressure, the Drop 1 provides only Temp, the Drop 2 provides Temp/Humidity, and the Drop 3 provides a full array of data. Keep in mind which Drop device you are linking to.

Important Note: Pressing the button on the front of the Drop 3 only makes it "Visible" so you can pair it to a device. It does not push atmospheric data when you press the button. The DROP does not maintain a continuous connection. It is on demand, and only updates when you repeat the process seen above as needed. This is to ensure the DROP battery is not rapidly drained by being left connected to the device.

The Kestrel Drop does not feed constant live updates like the Kestrel 4000 series devices do to the app.

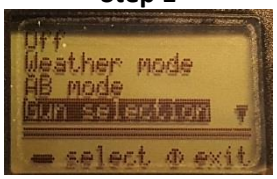
16.0 Uploading Profiles to Kestrel

AB Tactical has the ability to send (upload) your current weapon profile to a Kestrel, and other Applied Ballistic Compatible Devices via Bluetooth. This does require you have a Bluetooth version of the devices you wish to upload to. There are a couple of settings that must be enabled first in order to do this. Also before you start this process ensure you have completed your weapon profile in AB Tactical. See the notes before proceeding to the demonstration. Kestrel Device Bluetooth must be on, and the Kestrel must be paired to the device you are running AB Tactical on.

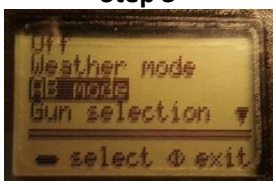
WARNING for Kestrel Sportsman Users: You can use this system to upload to a Kestrel Sportsman, HOWEVER. You need to verify you are using a G1 or G7 BC first. You can do this from the Bullet Screen. If you attempt to upload to a Kestrel Sportsman with a Custom Drag Curve, it will successfully upload, HOWEVER your BC will be set to 1.0 which will give you an error in your firing solution.

The proper steps are shown and described below for uploading a profile to the Kestrel (or other AB devices).

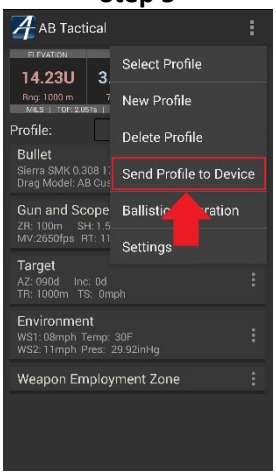
Step 1



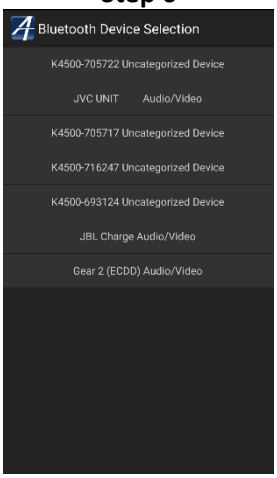
Step 3



Step 5



Step 6



Step 2

Step 4

Step 1) Access the Main Menu and scroll down to Gun Selection on the Device. Press Enter.

Step 2) Ensure “New Gun” is set to “On” If its Off simply press the right key pad arrow.

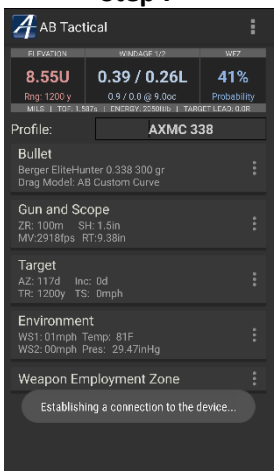
Step 3) Press the back button (Power Button), and select AB Mode.

Step 4) In AB Mode scroll down and highlight “Gun”. If you already have multiple guns in the Kestrel, then press the right key pad arrow until the selection reads “New Gun”. Then proceed over to AB Tactical.

Step 5) From any screen access the Menu and select “Send Profile to Device”

Step 6) A list of avaliable Bluetooth devices will open. Select the Device you wish to upload to.

Step 7



Step 8

Step 9

Step 7) AB Tactical will return to your previous screen and a notification will pop up with “Establishing a connection to the device”

Step 8) If done correctly the Gun will change to (*USERGUN#) on the Device. This should happen within a couple of seconds. If this does not happen in 30 seconds then the upload failed. **Note: Your not done yet**

Step 9) Select the weapon you just uploaded (press enter) and verify all the data is correct. Also make any adjustments you need to the Units and Click values for the turrets. Naming is optional, and not required to upload multiple profiles this way. Simply return to step 4, set to New Gun and upload the additional profiles.

17.0 Quick Key Reference

- Target Range Estimation (User Inputs)
- Capture Target Azimuth (Direction of Fire) from Phone
- Capture Target Inclination from Phone
- Capture GPS Coordinates from Phone
- Capture Pressure from Phone – Most modern phones have pressure sensors that are used to capture only the pressure from the phone – the temperature sensors are too inaccurate to use.
- Capture Temperature and Humidity from Local Weather Station – Only the temperature and humidity are captured from the local weather station
- Connect to a Kestrel 4000 series weather meter to continually monitor temperature, pressure, and humidity
- Connect to a Kestrel Drop